

A SPIRACULAR ABNORMALITY IN *ANASTREPHA STRIATA* LARVA (DIPTERA: TEPHRITIDAE) FROM COSTA RICA^{1,2}

Stanley R. Jones, Ke Chung Kim³

ABSTRACT: The abnormal posterior spiracular system of an *Anastrepha striata* larva collected from *Psidium guajava* is compared to those of typical systems. Abnormalities include four spiracular openings and five interspiracular processes instead of the usual three and four, respectively.

Although some species-specific differences and some intraspecific variations do exist, the posterior spiracles of third stage larval Tephritidae demonstrate highly consistent similarity in gross morphology (Phillips, 1946; Baker *et al.* 1944). Each larva bears a right and left stigmatic plate, each of which possesses three spiracular openings oriented at characteristic angles. In addition, each spiracular plate bears four sets of interspiracular processes, 1 dorsal, 2 lateral, and 1 ventral. Because of the consistency of these structures, they are important taxonomically and are typically figured in larval descriptions. No major deviations from the typical gross posterior spiracular pattern have previously been described for third stage tephritid larvae. For the schizophoran Diptera as a whole, very little has been reported on abnormalities of the posterior spiracles and associated structures. Bates (1934) reported an abnormality in the peristigmal gland cells of *Rhagoletis pomonella* Walsh, and Gammal-Eddin (1961) reported an abnormality in the posterior spiracles of *Stomoxys calcitrans* Lin. This paper reports the occurrence of an unusual structural pattern in the posterior spiracular system of *Anastrepha striata* Schiner.

Twenty-two third stage larvae of *A. striata* were collected from *Psidium guajava* L. on 8 June, 1986 at the Estacion Experimental, Fabio Baudrit, Universidad de Costa Rica, Costa Rica. Several of these were prepared for light microscopy by excising the head and 7th and 8th abdominal segments, soaking these in 10% KOH for 12 hrs, staining in acid Fuschin for 2 min., dehydrating in an ethyl alcohol series, transferring to xylene, then mounting

¹Received April 18, 1987. Accepted May 14, 1987.

²Authorized on April 9, 1987 for publication as Paper No. 7648 in the Journal Series of the Pennsylvania Agricultural Experiment Station. A contribution from the Frost Entomological Museum (AES Proj. No. 2894).

³The Frost Entomological Museum, Department of Entomology, The Pennsylvania State University, University Park, PA 16802.

on glass slides with Canada Balsam. Upon examination, one larva was found to possess four spiracle openings and five sets of interspiracular processes on the right spiracular plate (Fig. 1A). The right spiracular system of a typical larva is shown in Figure 1B. Table 1 lists minimum-maximum measurements taken from five typical larvae, compared with measurements from the aberrant larva. All measurements were taken with an ocular micrometer from the morphological characters shown in Figure 1B.

Despite the occurrence of an extra spiracular opening on the aberrant larva, the dimensions of the right spiracular plate were no larger than those of typical larvae. All measurements taken from the aberrant larva were well within the range of normal variation. All four spiracle openings and five interspiracular processes appeared fully and normally developed in every respect. The most noticeable difference between the aberrant and typical spiracular systems, besides the obvious possession of an extra spiracle opening and interspiracular process, occurred in the pattern or alignment of the spiracular openings. Spiracle openings 1 and 2 of typical *A. striata* larvae are generally parallel, while the 3rd deviates from this orientation (Fig. 1B). This typical spiracle opening pattern does not occur in the aberrant larva due



Figure 1A. Aberrant pattern of the right spiracular system taken from a third stage larva of *Anastrepha striata*.

to the space required to accommodate the 4th spiracular opening. It is impossible to determine from spiracle opening orientation or degree of development which opening is the additional one.

The probability of observing such a spontaneous mutation is very low, particularly in a single collection from infested guava fruit. This observation is considered significant because it shows the presence of spiracular mutation within *Anastrepha* species.

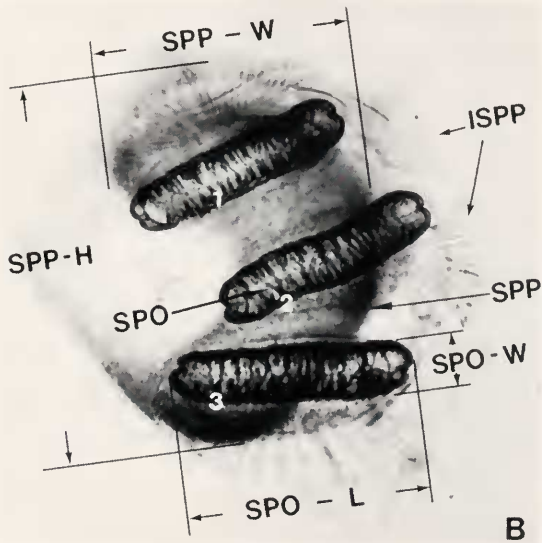


Figure 1B. Typical pattern of the right spiracular system taken from a third stage larva of *Anastrepha striata*. SPO-L spiracular opening length; SPO-W spiracular opening width; SPP-W spiracular plate width; SPP-H spiracular plate height; ISPP interspiracular processes, number of branches counted 0.14 mm from base.

Table 1. Comparison of minimum-maximum measurements taken from the right spiracular system of a typical and aberrant *Anastrepha striata* larva (all measurements in mm; N 5 for typical larvae). TYP Typical; ABT aberrant; SPO-L spiracular opening length; SPO-W spiracular opening width; SPP-W spiracular plate width; SPP-H spiracular plate height; ISPP interspiracular processes, number of branches counted 0.14 mm from base.

	SPO-L		SPO-W		SPP-H		SPP-W		ISPP	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
TYP	0.114	0.145	0.021	0.052	0.229	0.281	0.197	0.229	9	23
ABT	0.114	0.135	0.021	0.031	0.249		0.187		10	20

ACKNOWLEDGMENTS

We are grateful to L.F. Jiron for logistical help and to R. Ochoa for aid in tephritid larval collection.

LITERATURE CITED

- Baker, A.C., W.E. Stone, C.C. Plummer, and M. McPhail. 1944: A review of studies on the Mexican fruit fly and related Mexican species. USDA Misc. Publ. No. 531. Washington, D.C. 155 pp.
- Bates, M. 1934: The peristigmal gland cells of trypetid larvae (Diptera). *Ann. Entomol. Soc. Am.* 27:1-4.
- Gamal-Eddin, F.M. 1961. A record of an abnormality in the posterior spiracles of the stable fly (*Stomoxys calcitrans*, Lin.) maggots in Egypt (Diptera: Stomoxydinae) *J. Egyptian Publ. Health Assoc.* 26:235-237.
- Phillips, V.T. 1946: The biology and identification of tephritid larvae (Diptera: Tephritidae). *Mem. Entomol. Soc. Amer.* 12:1-161.